May 15, 2018

Mr. Douglas Luetjen
BSRE Point Wells, LP
c/o Karr Tuttle Campbell
701 Fifth Avenue, Suite 3300
Seattle, Washington 98177

Re: Landslide Area Deviation Request Information
Point Wells Redevelopment
Unincorporated Snohomish County, Washington
17203-54

Dear Mr. Luetjen:

We have revised this letter to address items in the County's May 9, 2018 memorandum (from Randolph Sleight to Ryan Countryman and Paul MacCready) that commented on our original April 24, 2018 landslide deviation request letter. In this letter, we clarify project information supporting the request for a deviation for development in a landslide area at the Point Wells Redevelopment (Project) in unincorporated Snohomish County, Washington.

In this letter, we discuss requirements of the Snohomish County Code for landslide hazard areas (SCC 30.62B.320 and .340, 2007 version in effect when project vested in 2011) and shows how these requirements have been met. This letter requests two separate deviations for developing the proposed a) Secondary Access Road and b) buildings (including the Sounder Station) in the Urban Plaza in a landslide hazard area after satisfying the SCC 30.62.320 and .340 requirements.

Project Background

The proposed project will be a mixed-use (i.e., residential, retail, commercial, and public recreation) urban center development with multiple low- to high-rise buildings, supporting infrastructure, an open space, and a secondary access road. Additional project information was provided in the April 2018 submittal to Snohomish County Planning and Development Services (PDS).

3131 Elliott Avenue, Suite 600
Seattle, Washington 98121
Fax 206.328.5581
Tel 206.324.9530

Landslide Area Regulations

Items Satisfying Landslide Hazard Area Requirements

The following items list SCC 30.62B landslide hazard area requirements and references specific to April 2018 protect submittal documents and our May 2018 geotechnical addendum letter (Hart Crowser 2018d) that satisfy these requirements. Items are organized using SCC 30.62B numbering.

SCC 30.62B.140 Geotechnical Report Requirements

- (1) and (2) are satisfied by Sections 3 to 6 and Figures 2 to 12 in the April 20, 2018 geotechnical report (Hart Crowser 2018a) with the following exceptions.
  - (2)(c) is not applicable since the site is not near one of the listed channel migration zones.
  - (2)(d) impervious surfaces, wells, and drain facilities, etc. are provided in the existing survey plans (EX1 and EX2), summarized on Figure 3 of the geotechnical report, and Figure 3 of the hydrogeologic report (Hart Crowser 2018c).
  - (2)(h) proposed development is described in detail on the April 25, 2018 project plans (Perkins + Will 2018).
  - (2)(j) drainage methods are shown on the civil drainage plans (C-300 series, Perkins + Will 2018), discussed in the drainage reports (MIG|SvR 2018a and 2018b) and discussed in Section 7.1.1 of the geotechnical report (Hart Crowser 2018a).
  - (2)(k & l) existing vegetation, vegetation management, and vegetation mitigation/restoration plans are included in the critical areas report (especially CAR Section 9, David Evans & Assoc. 2018) and discussed in Sections 5.1.5 and 7.1.1 of the geotechnical report (Hart Crowser 2018a).
  - (2)(m) upland erosion is discussed in Sections 6.4 and 7.1.4 of the geotechnical report (Hart Crowser 2018a). Coastal erosion due to wind and wave action, as well as shoreline stabilization methods are discussed in the coastal engineering report (Moffat & Nichol 2018).

SCC 30.62B.320 General Standards and Requirements for Landslide Hazard Areas

- (1)(a)(i) geotechnical reporting is satisfied, as noted in the prior section.

- (1)(a)(ii) would be satisfied by using best management practices (BMPs) and all known and available reasonable technology (AKART) of 30.63A SCC as determined appropriate by PDS for final design. At this preliminary stage of the project, preliminary BMPs are shown on the Civil temporary erosion and sedimentation control plans (C-200 series plans, Perkins + Will 2018), discussed in the drainage reports (MIG|SvR 2018a and 2018b), and discussed in Sections 6.4, 7.1.4, and 7.2 of the geotechnical report (Hart Crowser 2018a).

- (1)(a)(iii) collection, concentration or discharge of stormwater or groundwater within the landslide hazard area will be addressed by methods noted in the response above to SCC 30.62B.140(2)(j). This

will improve slope stability from current wet slope conditions by controlling surface water and groundwater.

- (1)(a)(iv) secondary access road will increase impervious surfaces on the slope some, but the added drainage improvements for the road would be designed to control surface and groundwater, which will improve slope stability from current wet slope conditions. Removal of vegetation for the secondary access road would be minimized to the extent practicable. Minimizing removal of vegetation and improving slope vegetation as recommended in Section 7.1.1 of the geotechnical report (Hart Crowser 2018a) would help reduce surface water infiltration, erosion, and shallow sloughing. Mitigation and restoration plans in the CAR (especially Section 9, David Evans & Assoc. 2018) should improve the habitat function for the project overall.

- (1)(b)(i) the risk of property damage, death, or injury from potential landslides will decrease from current conditions by slope stabilization retaining walls designing to resist landslide and seismic forces, as noted in Sections 5.1.6.1, 6.1, and 7.1.1 of the geotechnical report (Hart Crowser 2018a.

- (1)(b)(ii) erosion hazard would be controlled by BMPs and AKART methods, as noted in (1)(a)(ii) above.

- (1)(b)(iii) surface water discharge would be controlled and improved from current conditions on the east slope and conveyed to the base of the slope to existing conveyance pipes, which will reduce slope instability and sedimentation, as discussed in (1)(a)(ii) and (1)(a)(iv) above.

- (1)(b)(iv) impact wetlands, fish, and wildlife habitat conservation areas are discussed in Section 9 of the CAR (David Evans & Assoc. 2018).

- (2) shoreline stabilization measures are discussed in the coastal engineering report (Moffat & Nichol 2018) and setbacks and protection of wetlands and habitat conservation measures are discussed in Sections 3, 8, and 9 of the CAR (David Evans & Assoc. 2018).
  - (2)(a) the existing shoreline bulkhead will be removed, the shoreline flattened (effectively setting back, and the shoreline restored to natural habitat conditions (see CAR Section 9, David Evans & Assoc. 2018) using minor non-structural stabilization measures (Moffat & Nichol 2018).
  - (2)(b) landslide stabilization measures consisting of a retaining wall for the secondary access road are necessary to stabilize the slope to adequate factors of safety per SCC 30.62B.340(3)(b), as discussed in the next section.

SCC 30.62B.340 Landslide Hazard Area

Secondary Access Road

- **(2) Alternate Locations Considered.** Construction of the secondary access road is required by PDS. We understand its location is required to be different than the existing site southern access via

Richmond Beach Drive, which leaves access routes to the northeast and southeast as possible options. Our August 2016 report (Hart Crowser 2016) shows access routes considered (Appendix E) to the northeast (Abandoned Access Road) and southwest (current Secondary Access Road). Both locations are located in landslide hazard areas. The northeastern option required more grading in wet areas and the Abandoned Access Road was displaced in places, suggesting less stable conditions (Figure 5 Hart Crowser 2018a). The current southeast Secondary Access Road location shown on Plan A-051 and in the geotechnical report (Figures 5 and 10, Hart Crowser 2018a) encounters fewer geologic critical areas, especially landslide hazard areas, than the northeast location. The southeast location is also in an area that has flatter average slopes (Figure 4, Sections E, F, and G, Hart Crowser 2018a). Thus, the southeastern access route option is more suitable than the northeast route. However, final design will need to follow final geotechnical design recommendations for subgrade preparation, drainage, and stabilization measures.

- **(2) Geotechnical Report Demonstrates Code Required Protection is Provided.** The proposed retaining wall for the secondary access road would improve slope stability above current conditions to satisfy the required factors of safety in SCC 30.62B.340(3)(b), as discussed in Sections 5.1.6.1 and 7.1.1 of the geotechnical report (Hart Crowser 2018a). The geotechnical addendum letter (Hart Crowser 2018d) clarifies how the stability analysis for the retaining wall demonstrates it is feasible to achieve the required factors of safety in SCC 30.62B.340(3)(b). Key points are summarized below.

  - The retained height of the retaining wall (Figures 22, 22a, 23, and 23a; 'a' designates updated figures in the addendum letter) permanently supports about 40 feet above final grades. The lower 20 feet below grade would be for building basements and lateral earth pressures would be supported by basement floor slabs transferring.

  - Geotechnical slope stability analysis/calculation results Figures 22 to 23 (including 22a and 23a) show how a generic retaining wall providing 78 kips/foot of wall of resisting force achieves the required County factors of safety. Several retaining wall options could be used. Figures 22a and 23a of our addendum letter demonstrate how a permanent soldier pile and tieback retaining wall system is feasible to provide these loads (includes soldier pile and tieback geometry and loads).

    - Section 5.1.6.1 of our report (page 23) discusses how a high strength (i.e., soil cohesion of 10,000 pounds per square foot (psf)) was used in the stability analysis (results in Figures 18 - 25) to represent the retaining wall (typically steel and concrete) that would be designed to be structurally strong enough so slip surfaces do not go through it.

    - A high cohesion (10,000 psf) was not used for soil, as noted above.

- Figures 22a and 23a include excavation west of the railroad to elevation +6 feet, showing factors of safety above the required values. See our May 2018 addendum letter for a more detailed discussion.

- Perched groundwater was encountered in the five vibrating wire (VW) piezometers installed in three borings for the secondary access road, as noted in Table 2 of our report. As noted in Section 5.1.6.1 (Section G-G' subsection, pages 22 to 23), perched groundwater was encountered at different elevations in the VW piezometers. However, stability analysis used a conservative groundwater assumption that all soil below the highest perched groundwater elevation is saturated. Based on this conservative groundwater assumption, stability analysis shows that groundwater drainage control was not required to achieve the required factors of safety for the Secondary Access Road.

- Landslide runout does not appear to be a requirement in SCC 30.62B, nor is there a well-accepted standard of practice for how it is used and applied in conjunction with slope stability analysis. In our opinion, the existing landslide runout methods are suitable to be used as estimates, but should be used with caution for design purposes. Site slopes range from about 40 percent near Section B to 20 percent near Section G, which are much less than the estimated Woodway pre-slide slopes (70 percent). Thus, in our opinion, a Woodway type slide runout is highly unlikely east of this project. Estimated runout distances, from the references we found, for the 50th to 90th percentile slides studied were between about 200 to 300 feet, respectively, from the headscarp of landslides. If these rough estimated runout distances start from the headscarp of slip surfaces estimated in our slope stability analysis, the runout may or may not reach the base of the slope near the secondary access road and Upper Plaza buildings. However, slopes at Section G are very flat so are likely closer to the lower end of the runout distances in the studies we reviewed.

- The geotechnical report and addendum letter meet the requirements of SCC 30.62B.320, as discussed in the prior section.

- (3)(a) vegetation removal would be minimized, as discussed in SCC 30.62B.320(1)(a)(iv) and the vegetation management and restoration are discussed in the CAR (David Evans & Assoc. 2018).

- (3)(b) slope stability factors of safety are satisfied, as discussed in (2) [Geotechnical Report] above.

- (3)(c & d) different retaining wall and slope stabilization options (single wall and multiple stabilization tiers) are presented in the geotechnical report (Hart Crowser 2018a) that satisfy this and the prior item.

- (3)(e) utility lines would be constructed along the secondary access road according to these requirements, as the existing utilities in this sloped area are now.

- (3)(f) stormwater, surface water, and collected groundwater along the secondary access road would be collected and conveyed down slope to a suitable discharge point, as discussed in SCC 30.62B.140(2)(j) and SCC 30.62B.320(1)(a)(iii) above.

Urban Plaza Buildings (Including Sounder Station)

This section is intended to be a separate deviation request, from the Secondary Access Road, for the buildings in the Urban Plaza. These proposed buildings are currently located within a landslide hazard area, which would be protected by a future retaining wall and/or other slope stabilization methods.

(2) Alternate Locations. We understand from the project architect that buildings in the Urban Plaza (including the Sounder Station) need to be located in the front part of the site because the multi-modal transportation center for busses, trains, and cars has to be located here by the railroad, existing entry road, and proposed secondary access road. Additional building siting considerations are noted in the April 24, 2018 Urban Center Zoning Variance request by Perkins+Will.

(2) Geotechnical Report Demonstrates Code Required Protection is Provided. The same comments as noted above for the Secondary Access Road apply.

Other Items

We understand the Secondary Access Road grading widths have recently been revised to stay within the property limits for the eastern narrow section of this road. We understand that short retaining walls would be used on one or both sides to achieve these requirements unless agreements are reached with adjacent property owners or the Town of Woodway during final design. In our opinion, this type of change should be geotechnically feasible and can be determined during a later design stage.

Conclusions

In summary, our findings and recommendations are:

- The proposed development would not decrease and would actually increase slope stability and improve drainage conditions on the slope by the secondary access road and above the Urban Plaza. We are of the opinion that current slope stability analysis demonstrates feasible options to achieve the code required for slope stability factors of safety.

- Some items to completely satisfy SCC 30.62B would need to be completed during final design stages when final design plans are being completed. These items include, but are not limited to, final geotechnical stability analysis, slope stabilization recommendations, permanent drainage recommendations, and building support recommendations.

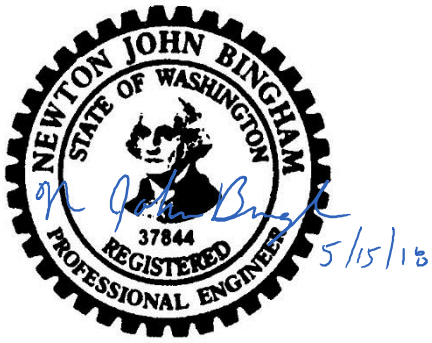
- If the proposed development is designed, constructed, operated, and maintained in conformance with the appropriate construction practices and County regulations and final design geotechnical recommendations by Hart Crowser, as well as by other design team members, slope stability, drainage, and habitat protection, mitigation, and restoration are unlikely to be degraded by the proposed development (many would be improved), and County requirements for SCC 30.62B would be satisfied.

- Based on our review of the documents included in the April 2018 submittal to PDS, we are of the opinion that a deviation to allow development in the landslide hazard area can be completed to satisfy the requirements of SCC 30.62B.140, SCC 30.62B.320, and SCC 30.62B.340.

We trust this letter provides the required information. Please let us know if you or others have any questions about the content of this letter.

Sincerely,

HART CROWSER, INC.



N. JOHN BINGHAM, PE
Senior Associate, Geotechnical Engineer

References

David Evans and Associates, 2018. Critical Areas Report, BSRE Point Wells, LP, Redevelopment Project, April 2018.

Hart Crowser 2018a. Subsurface Conditions Report: Point Wells Redevelopment, April 20, 2018.

Hart Crowser 2018b. Point Wells Urban Center, Environmental Remediation Approach, Memorandum April 20, 2018.

Hart Crowser 2018c. Point Wells Redevelopment, Hydrogeologic Report, April 20, 2018.

Hart Crowser 2018d. Subsurface Conditions Letter Addendum: Point Wells Redevelopment, May 14, 2018.

Hart Crowser 2016e. Draft Final, Subsurface Conditions Report, Point Wells Redevelopment, Prepared for BSRE Point Wells, LP by Hart Crowser, August 4, 2016.MIG|SvR 2018a. Point Wells Development, Preliminary Short Subdivision Submittal, Targeted Stormwater Site Plan Report, April 24, 2018.

MIG|SvR 2018b. Point Wells Development, Urban Center Submittal, Targeted Stormwater Site Plan Report, April 24, 2018.

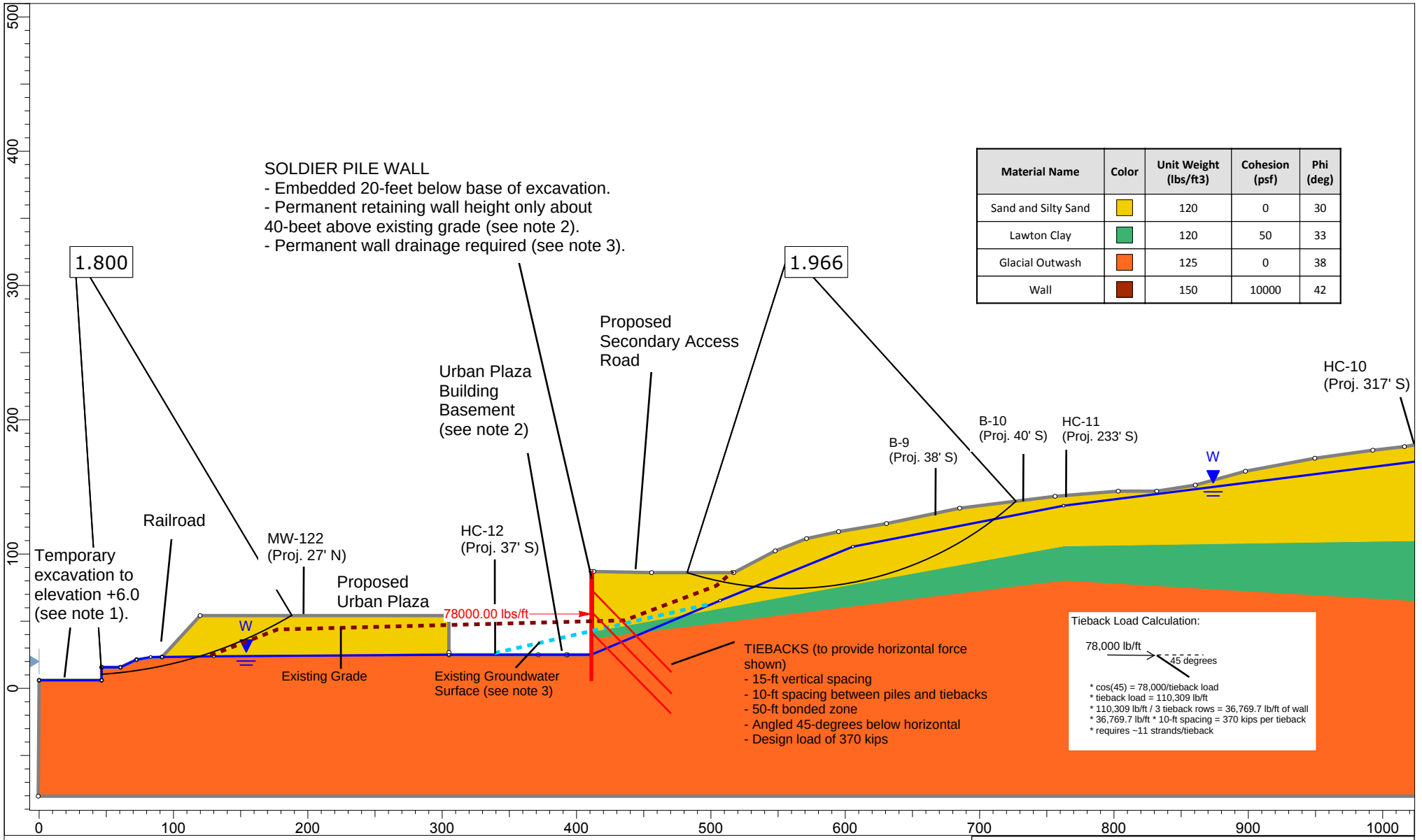
Moffat & Nichol 2018. Coastal Engineering Assessment, Point Wells Redevelopment, April 23, 2018.

Perkins + Will 2018. Point Wells Development, Urban Center Review Response, Combined [Plan] Set, April 25, 2018.

Snohomish County 2007. Snohomish County Code, Chapters 30.62A - Wetlands and Fish & Wildlife Habitat Conservation Areas and 30.62B Geologic Hazardous Areas.

L:\Notebooks\1720354_Point Wells EIS Geotech Analyses\Deliverables\Letters\Request Letter\Landslide Area Deviation Request Letter 5.15.2018.docx

Attachments:
Figure 22a - Section G-G' Wall with Backfill - Static
Figure 23a - Section G-G' Wall with Backfill - Pseudostatic



Notes:
1) Tempoary excavation for remedial excavation or building basements. Basement structure will transfer permanent earth loads to soil on other side of basement. Permanent grades around buildings will be raised to about elevation 50 feet just west of railroad.
2) Building basement floors will support lateral earth pressures below existing grade.
3) Permanent wall drainage required since existing groundwater level above base of excavation.

Point Wells
Richmond Beach, Washington

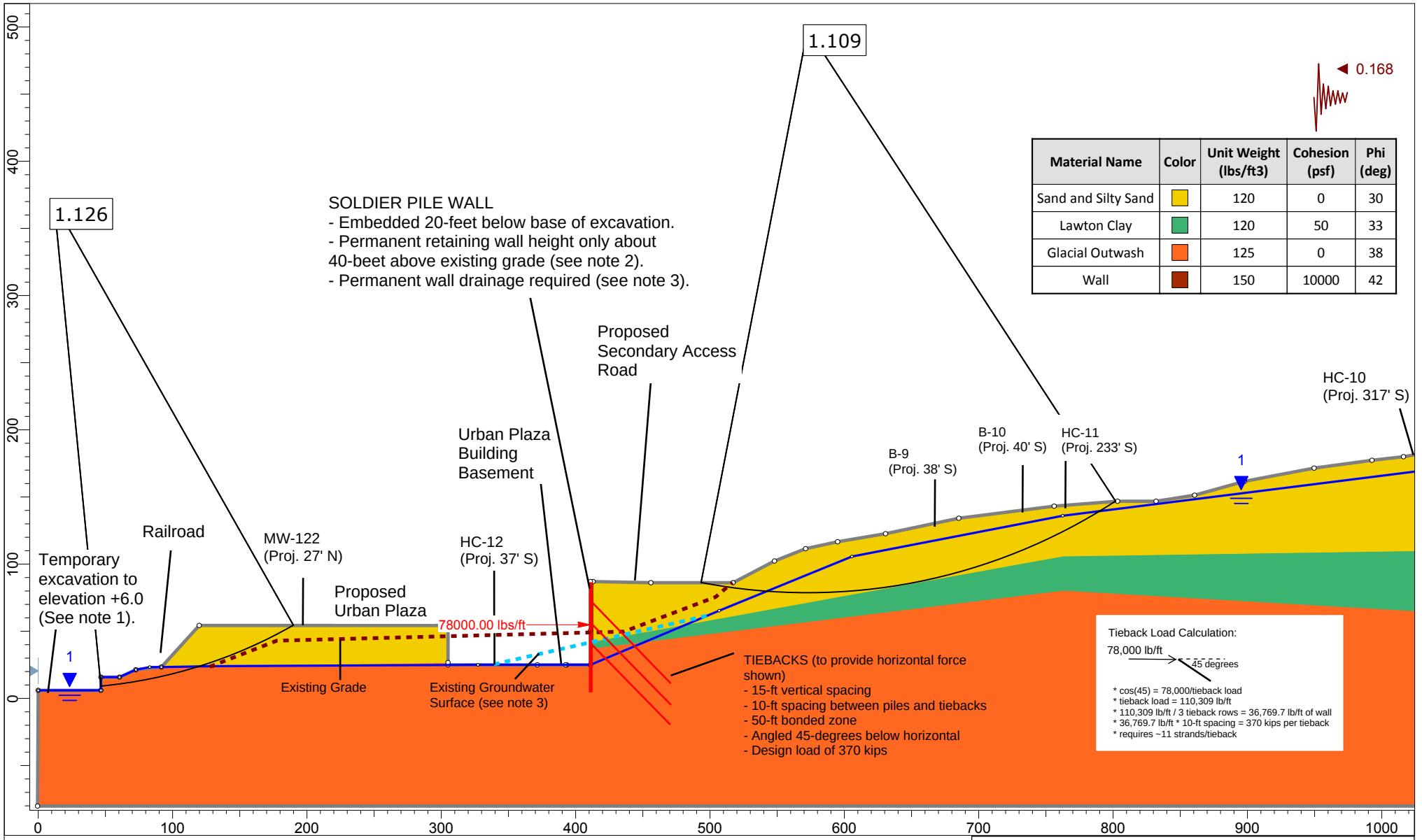
Section G-G'
Wall with Backfill - Static

17203-54 Scale 1:1200 5/18

HARTCROWSER

Figure
22a

A-37 Landslide Deviation Request



Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Sand and Silty Sand		120	0	30
Lawton Clay		120	50	33
Glacial Outwash		125	0	38
Wall		150	10000	42

Notes:
1) Temporary excavation for remedial excavation or building basements. Basement structure will take permanent earth loads and grade around buildings will be raised to about elevation 50 feet west of railroad.
2) Building basement floors will support lateral earth pressures below existing grade.
- Permanent wall drainage required since existing groundwater level above base of excavation.

Point Wells
Richmond Beach, Washington

Section G-G'
Wall with Backfill - Pseudostatic

17203-54 Scale 1:1200 5/18

HARTCROWSER

Figure **23b**

A-37 Landslide Deviation Request